External Review of the Cooperative Institute for Research in Environmental Sciences (CIRES)

A Presentation to the
NOAA Science Advisory Board

Walter Faulconer
Review Panel Chair

November 2016

CIRES

University of Colorado Boulder

Outline

- Science Review Panel
- Overview of the Cooperative Institute (CI)
- CIRES Themes
- Findings and Recommendations
  - Strategic Plan
  - Science Review
  - Science Management
  - Education and Outreach
- Summary and Conclusions
- Overall Rating

Science Review Panel

Walt Faulconer, Chair
NOAA Science Advisory Board

Ana Barros, Ph.D.
Duke University

Mike Anderson, Ph.D.
California Department of Water Resources

Scott McIntosh, Ph.D.
National Center for Atmospheric Research

Darrell Winner, Ph.D.
U.S. Environmental Protection Agency

David Wilmouth, Ph.D.
Harvard University

Fernando Miralles-Wilhelm, Ph.D.
University of Maryland

Overview of CIRES

www.cires.colorado.edu

- **Vision**: CIRES is instrumental in ensuring a sustainable future environment by advancing scientific and societal understanding of the Earth system.

- **Mission**: To conduct innovative research that advances our understanding of the global, regional, and local environments and the human relationship with those environments, for the benefit of society.

CIRES Programs

Centers

Programs

CIRES Research Themes

Research at CIRES is organized around 9 research themes:

- Air quality in a changing climate
- Climate forcing feedbacks and analysis
- Earth system dynamics, variability, and change
- Management and exploitation of geophysical data
- Regional science and applications
- Scientific outreach and education
- Space weather understanding and prediction
- Stratospheric processes and trends
- Systems and prediction models and development

Strategic Plan:
Overall Findings

- **CIRES has a well-written vision statement and mission statement for the research they conduct and has excellent administrative structure overseeing a rich and diverse research portfolio.**
- **The research conducted at CIRES is world-class and award winning.**
- **The Institute has successfully reached beyond the initial NOAA funding by developing additional research activities that are beneficial to NOAA interests.**
- **There is a well-organized structure for the interaction between CIRES and the NOAA Boulder Laboratories. Some of that structure is illustrated in the five-year work plan from 2012 to 2017 provided to the committee during the review.**
  - Almost half of the CIRES staff is embedded within the NOAA Boulder Laboratories.
  - CIRES staff working at the lab have a CIRES advisor and a NOAA or CIRES Science Advisor.
  - CIRES researchers working at the University have a connection to one of 9 campus departments where many CIRES fellows and faculty are embedded.

Strategic Plan: Findings and Recommendations

- The physical separation of NOAA and CU naturally creates boundaries to scientific collaboration. The challenges with passing through security at NOAA and finding parking at CU serve as additional barriers
  - While acknowledging the financial challenges of this recommendation, the panel encourages consideration of a new building at NOAA that is located outside of the secure area, which would serve as a point of connection for the communities from NOAA, the CU campus, and other partners.

- It is clear that CIRES is very responsive to NOAA and gets very high marks to responding to NOAA needs.
  - CIRES should also be more proactive as a NOAA partner in helping to be thought leaders in the strategic direction of critical science, research, policy, etc. This should also be reflected in the strategic planning of CIRES.

Strategic Plan: Findings and Recommendations

- **CIRES does an excellent job of partnering with many government, academic and industry organizations, as reflected by the variety of sponsors funding many of its projects.**
  - **There are still untapped/non-traditional organizations that CIRES should investigate partnering with that could be beneficial to NOAA in the future, including partnering with a HBCU (e.g., Howard, Morgan); Defense and Intelligence organizations and other parts of the university.**

- **CIRES has seen significant growth in both breadth and depth. While CIRES leadership is doing very well at managing the challenges that come with significant growth, it raises the potential concerns including not losing what makes CIRES unique and special to NOAA, avoiding "stove pipes" and maintaining a "one team" culture.**
  - **Capture lessons learned and incorporate continual improvement into overall practices.**

Strategic Plan: Findings and Recommendations

- CIRES does an excellent job of tracking progress through metrics and "market indicators" (e.g., funding, awards, paper citations)
  - CIRES should add a few metrics that are useful in indicating organizational health including win rate of opportunities; win rate of dollars; % of re-compete opportunities versus new opportunities and diversity.

Science Review: Findings and Recommendations

- CIRES is producing outstanding science. A testament to this is over 700 publications involving CIRES authors or coauthors in 2015 alone, along with numerous awards received by CIRES scientists in the last 4 years. CIRES researchers are leaders and emerging leaders in their scientific fields. The numerous awards and broad recognition of the work is a testament to the high quality of the work conducted.
  - We recommend CIRES continue with research in all 9 identified themes and maintain their excellent level of scientific achievement. Well done.

- CIRES researchers have a fantastic capacity to work along the research lines of ESRL and NCEI while being nimble enough to accommodate opportunistic work have established themselves as the go-to institute for a number of research topics.
- The IGNITE talks presented by the graduate students during the review were brilliant and a great way to get an overview of a number of research activities.

Science Review: Findings and Recommendations

- **CIRES is ideally positioned to bring together the space weather enterprise. Space Weather is a large growth opportunity.**
  - **The Director of CIRES should consider reaching out to other Universities, interested stakeholders and other Government Agencies involved in space weather to create a Space Weather Consortium and a Center for Space Weather Research at CU to provide some leadership and focus on this developing area.**

- **Some CIRES presentations mentioned the integration with social sciences but no real evidence or products were shown.**
  - **Social science integration may not be a major focus area or core competence of CIRES, however, given the growing importance at NOAA, CIRES should at least address it more through proactive partnerships, etc. This is an opportunity to help NOAA.**

Science Management: Findings and Recommendations

- **In terms of financial goals, the Institute has exceeded expectations. Their outstanding work has attracted additional funding that has increased in each of the last 4 years.**

- **One of the challenges in the science management area of the institute is adapting to the different rules and expectations of the individual divisions at ESRL and the centers. CIRES administrators have demonstrated a willingness to work with the Labs and Centers to enable CIRES researchers to pursue their research interests in a manner consistent with meeting the research needs of the Lab.**

- **In some ESRL divisions, CIRES scientists are not allowed to be the Principal Investigator (PI) on proposals that are submitted through NOAA, creating a situation in which CIRES scientists do not receive appropriate external recognition for their work.**
  - **Establish a new internal designation of 'Science PI' to recognize the leadership of CIRES scientists on awarded proposals they wrote but were not allowed to be externally listed as PI.**

Science Management: Findings and Recommendations

- **CIRES has four levels of internal promotion for both Research Scientists and Associate Scientists, allowing for career advancement within the cooperative institute. CIRES also internally awards scientists when their collaborative efforts with NOAA colleagues leads to Department of Commerce awards being issued on the NOAA side, as well as with annual Outstanding Performance Awards within CIRES.**
  - **CIRES should continue with the current program of career track advancement and recognition that seems to be working well.**

- **Workforce diversity is somewhat lacking at CIRES with approximately 80% of employees being white and 62% being men.**
  - **The review committee agrees with the current CIRES direction to build pipelines to minority academic institutions and consider cluster hires.**

Science Management: Findings and Recommendations

- A majority of CIRES scientists who are employed by CU as research associates or research scientists and work closely with NOAA Boulder Laboratory scientists to meet critical research and operational needs. CI funding levels for individual CIRES Scientists vary widely from full-time support to a fraction of the annual salary, which may vary year-to-year.
  - Strategic collaborative planning is needed among CIRES, NOAA and CU to further develop processes and infrastructure specifically targeting the ability of partially funded CIRES employees to secure continued full-time financial support, to foster equitable access to career development opportunities, and to nurture a climate of intellectual entrepreneurship and leadership.

- Cuts in federal staffing at the NOAA Boulder Laboratories have resulted in an aging organization.
  - NOAA should prioritize stabilizing the NOAA Boulder Laboratories' federal work force.

Education/Outreach: Findings and Recommendations

- CIRES has a wide-ranging connection to education within the University and have developed a world-class structure for external education and public engagement . CIRES also benefits from identifying education and outreach as a major program theme.

- The magazine, Spheres; Science on a Sphere; the NSIDC Sea Ice Index and related products; as well as a vigorous and noteworthy presence in the national news and social media are excellent examples of work in the education and outreach arena.
  - The panel recommends that CIRES continue their outstanding public outreach and education efforts by pursuing an even more global perspective, primarily through the internet.

Education/Outreach: Findings and Recommendations

- **The panel found excellent graduate student involvement with 100-130 graduate students and thirty postdocs working with CIRES Faculty Fellows and CIRES Research Scientists.**
  - **CIRES should continue their active engagement of graduate students at CU and look for ways to expand the reach of the CIRES Graduate Association even further.**
  - **Other successful educational programs including the visiting fellows and Post-Doctoral program should be continued and strengthened. CIRES should also investigate other area organizations to partner with, such as the Colorado Space Business Roundtable, Colorado Space Alliance and The Space Foundation that could be beneficial for the CIRES education and outreach pipeline.**

Summary and Conclusions

- The relationship between NOAA, CIRES, and the University of Colorado is of great benefit to all three entities. CIRES is essential to the successful research operations of NOAA and is critical to those at the University of Colorado.

- CIRES is highly regarded within the University and is broadly engaged.

- The CIRES director, Waleed Abdalati, is highly regarded by NOAA, CIRES, CU and the broader science community. He received particularly high praise from the NOAA division directors during the CIRES Review.

Overall Rating

OUTSTANDING

CIRES

University of Colorado Boulder

NOAA


NOAA
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE

Questions?